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(54) VIBRATOR SYSTEM WITH WAVEGUIDE FOR WELLNESS CUSHIONING ELEMENT

(57) The present disclosure provides a vibrator for a wellness cushioning element. The vibrator includes a transducer housing (111) adapted to receive a transducer (250) configured to produce vibrations along an axis (A) of the vibrator. A transmitter (120) is connected to the transducer housing and configured to transmit the vibrations to an outside. The transmitter comprises a receiving surface (121) in regard to the transducer housing. The waveguide (130) is connected to the transducer (250) housing and extends on the receiving surface of the transmitter. The waveguide (130) is configured to guide vibrations from the transducer to the receiving surface (121) of the transmitter (120).

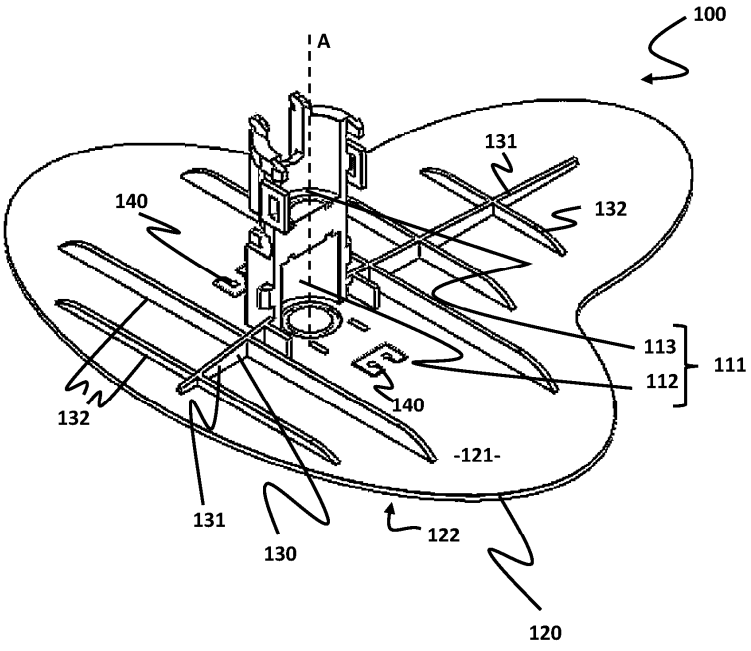

Fig. 1

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Description

FIELD OF DISCLOSURE

[0001] The present disclosure relates to vibration systems for wellness applications, and more particularly to a vibrator, vibrator system, and method for enhancing wellness using a cushioning element with an integrated waveguide for efficient vibration transmission.

BACKGROUND

[0002] Document US 2022/0175602 discloses a mattress combined with a sound vibration module and air fibers, and an operating method therefor. An air mattress to which air fibers are applied comprises a sound vibration module comprising a speaker, a tactile transducer, a controller, and an amplifier, the sound vibration module being manipulated to generate low-frequency vibration through the conversion of an input sound source into vibration or sound after being amplified, and at the same time emit same as sound. While sound vibration stimuli are applied to the skin through the sound vibration module, contact pressure is distributed on the air mattress to which air fibers are applied, and a static pressure state can be maintained as a fluctuating pressure state. Moreover, the effect of improving muscle strength by healing of muscle cells, blood flow improvement, and low-frequency vibration can be realized through vibration stimulation, to thereby stably prevent the occurrence of bedsore.

SUMMARY

[0003] Wellness cushioning elements, such as mattresses, chairs, and other furniture, are used to provide comfort and support for users during rest, sleep, or extended periods of sitting. In recent years, there has been growing interest in incorporating vibration technology into these cushioning elements to enhance relaxation, focus or wellness.

[0004] Traditional vibration systems for wellness applications typically utilize motors or eccentric weights to generate mechanical vibrations. These systems often produce localized, high-intensity vibrations that can be uncomfortable or even disruptive to the user. Additionally, the vibrations may not be evenly distributed across the cushioning element, resulting in inconsistent user experiences.

[0005] Another challenge with existing vibration systems is their integration into cushioning elements without compromising comfort or flexibility. Rigid vibration components can create pressure points or reduce the overall cushioning effect of the element. Furthermore, many current systems struggle to maintain effectiveness when the cushioning element is folded or adjusted, limiting their versatility in various furniture applications.

[0006] Energy efficiency and noise reduction are also ongoing concerns with conventional vibration systems. Many existing solutions consume significant power and produce unwanted noise, which can detract from the intended relaxation or wellness effects.

[0007] It has been appreciated by the present inventors that a vibrator system with improved vibration transmission and distribution is needed that overcomes one or more of these problems.

[0008] In a first aspect of the present disclosure, a vibrator for a wellness cushioning element is provided. The vibrator includes a transducer housing adapted to receive a transducer configured to produce vibrations along an axis of the vibrator, a transmitter configured to transmit the vibrations of the vibrator to an outside and connected or fixed to the transducer housing, the transmitter comprising a receiving surface in regard to the transducer housing, and the waveguide connected or fixed to the transducer housing and extending on the receiving surface of the transmitter. The waveguide is configured to guide vibrations from the transducer to the receiving surface of the transmitter. This configuration enables efficient transmission of vibrations from the transducer to the wellness cushioning element while minimizing localized pressure points. Preferably, the transducer housing, the waveguide and the transmitter are directly fixed on each other. The transmitter is preferably a fixed and/or passive element, for example excluding any movement and only vibrating. The transmitter may not emit any significant audible sound.

[0009] Advantageously, the transmitter is integral with the transducer housing and the waveguide, which provides a compact and robust design while limiting any lost in vibrating power.

[0010] Advantageously, the vibrator includes the transducer in the transducer housing. This allows for a complete vibrator, simplifying installation and maintenance.

[0011] Preferably, the vibrator including no moveable element outside the transducer: all the element of the vibrator are thus fixed one to the others. This limits or suppresses any pollution or resonance affecting the vibrations.

[0012] Advantageously, the transmitter includes a transmitting plate extending in a plane intersecting the axis of the vibrator and including the receiving surface and an emitting surface opposite the receiving surface, an angle between the plane and the axis being preferably 70° to 110°, preferably around 90°. This configuration allows for optimal distribution of vibrations across the transmitter.

[0013] Advantageously, the shape of a peripheral edge of the transmitter is at least partially rounded. This reduces the risk of damage to the surrounding materials and improves user comfort by a smooth emission of the vibrations. For example, the peripheral edge of the transmitter may be formed by ovals or ovoid shapes, such as one oval or two superposed ovals. More complex shapes such as a rounded cross or a circle may also be contemplated.

[0014] Advantageously, the waveguide comprises a rib having an edge aligned on an axis differing from the axis of the vibrator and from the plane of the transmitting plate. This design enhances the homogeneous emissions of vibrations.

[0015] Advantageously, the waveguide comprises at least two ribs symmetrically disposed with regard to the transducer housing enables more uniform distribution of vibrations, improving the overall user experience. Secondary ribs may also be provided so as to cross the above main ribs.

[0016] Advantageously, the waveguide comprises a plurality of ribs having a thickness and/or a height decreasing from the transducer housing to a peripheral edge of the transmitter. For example, at least part of the ribs may have decreasing thickness and/or height. Alternatively or in combination, the ribs may have a constant thickness and/or height decreasing from the transducer housing to the peripheral edge.

[0017] Advantageously, the vibrator is made of a material having a tensile strength of 0.1 to 3.1 N/mm^2, the material being preferably a thermoplastic elastomer. This material selection provides a homogenous emission of vibrations with an optimal longevity of the vibrator.

[0018] In a second aspect, a vibrator system for a wellness cushioning element is provided. The vibrator system comprises at least one vibrator according to the first aspect, a power source to power the transducer, and a controller to control the transducer and/or the power source. The controller and the power source may be integrated in a single power and control device. This integrated system allows for precise control and customization of the vibration experience.

[0019] In a third aspect, a wellness cushioning element is provided. The element comprises at least one cavity and the vibrator system of the second aspect, wherein the at least one vibrator is inserted in the at least one cavity. This design enables seamless integration of the vibration system into the cushioning element, enhancing user comfort and experience.

[0020] Advantageously, the wellness cushioning element comprising a foam element defining the at least one cavity, the foam element having a density of 600 to 1400 g/m^2, provides optimal support and vibration transmission characteristics.

[0021] Advantageously, the wellness cushioning element comprises at least two cavities receiving each a vibrator, the cavities being aligned on a longitudinal or a transversal axis of the wellness cushioning element. This configuration allows for targeted vibration distribution across different areas of the cushioning element.

[0022] In a fourth aspect, a method to enhance wellness of a user is provided. The method comprises subjecting to vibrations a user sitting or lying on the wellness cushioning element of the third aspect. This method enables the delivery of wellness vibrations to enhance user wellness and comfort.

BRIEF DESCRIPTION OF FIGURES

[0023] Embodiments of the disclosure will be described, by way of example, with reference to the following drawings, in which:

FIG. 1 illustrates a perspective view of a vibrator for a wellness cushioning element, according to a first aspect of the present disclosure.

FIG. 2 illustrates an exploded view of a vibrator for a wellness cushioning element, according to a second aspect of the present disclosure.

FIG. 4 illustrates a perspective view of a vibrator for a wellness cushioning element, in accordance with a third aspect of the present disclosure.

FIG. 5a illustrates an orthogonal view of a wellness cushioning element with vibrators, according to aspects of the present disclosure and Fig. 5b illustrates a pattern of vibration and interferences created by the wellness cushioning element of Fig. 5a.

Fig. 6a and Fig. 6b illustrates a schematic comparison between a vibrator without waveguide (Fig. 6a) in view of a vibrator with a waveguide (Fig. 6b) according to the disclosure.

[0024] Common reference numerals are used throughout the figures to indicate similar features.

DETAILED DESCRIPTION

[0025] The present disclosure provides a vibrator system for wellness cushioning elements, such as mattresses, chair cushions, and other furniture, designed to enhance user comfort and wellness. The system includes a vibrator with a transducer housing, a transmitter, and a waveguide. The transducer housing is adapted to receive a transducer configured to produce vibrations along an axis of the vibrator. The transmitter, connected or fixed to the transducer housing, is configured to transmit the vibrations of the vibrator to the outside. The transmitter comprises a receiving surface in regard to the transducer housing. The waveguide, connected or fixed to the transducer housing, extends on the receiving surface of the transmitter and is configured to guide vibrations from the transducer to the receiving surface of the transmitter. This configuration allows for efficient transmission of vibrations from the transducer to the wellness cushioning element, addressing challenges associated with traditional vibration systems such as uneven distribution of vibrations, discomfort due to localized pressure points, and limitations in flexibility and adjustability of the cushioning element.

[0026] For the purposes of this disclosure, the following terms are defined as follows:

- "Transducer": A device that converts one form of energy into another. In this context, the transducer is configured to produce mechanical vibrations from an electrical input.

- "Transducer housing": A structure or enclosure that houses the transducer.

- "Transmitter": A component that transmits the vibrations produced by the transducer to the outside, i.e., to the wellness cushioning element. For example, the transmitter may a plate or flat element. The shape of a peripheral edge of the transmitting plate may be at least partially rounded, which may facilitate the transmission of vibrations and reduce sharp edges that could cause discomfort or damage to the wellness cushioning element. The transmitter may have a receiving surface intended to receive vibrations from the transducer and an emitting surface intended to emit these radiations towards an outside of the vibrator.

- "Waveguide": A structure that guides waves, such as sound or electromagnetic waves. In this context, the waveguide is configured to guide vibrations from the transducer to the receiving surface of the transmitter. In the embodiment below, the waveguide comprises at least one and preferably a plurality of ribs extending from the transducer housing on the receiving surface of the transmitter.

- "Wellness cushioning element": A cushioning element, such as a mattress, chair, or other furniture, designed to provide comfort and support for users, and in this context, integrated with the vibrator system to enhance wellness through vibration distribution.

[0027] Aspects or features of any of the embodiments described below may be combined with aspects or features of any of the other embodiments described to form further embodiments without losing the effect sought.

[0028] It will be understood that the above description of a preferred embodiment is given by way of example only and that various modifications may be made by those skilled in the art. What has been described above includes examples of one or more embodiments. It is, of course, not possible to describe every conceivable modification and alteration of the above devices or methods for purposes of describing the aforementioned aspects, but one of ordinary skill in the art can recognize that many further modifications and permutations of various aspects are possible. Accordingly, the described aspects are intended to embrace all such alterations, modifications, and variations that fall within the scope of the appended claims.

[0029] Referring to Fig. 1, a first embodiment of a vibrator 100 for a wellness cushioning element is illustrated. The vibrator 100 includes a transducer housing 111, which is adapted to receive a transducer (not shown) configured to produce vibrations along an axis A of the vibrator 100. The transducer housing 111 comprises a transducer housing body 112 and a transducer housing cover 113, which together form a protective enclosure for the transducer.

[0030] In the embodiment of Fig. 1, the transducer housing cover 113 is pivotably connected to the transducer housing body 112. In Fig. 1 the transducer housing 111 is shown in an open configuration, with the transducer housing cover 113 extending above the transducer housing body 112, i.e. aligned on the axis A.

[0031] Once a transducer is accommodated within the transducer housing body 112, the transducer housing cover 113 may be pivoted along an axis perpendicular to axis A, to form the transducer housing 111 and to enclose the transducer aligned on the axis A. Clipping element may be provided on the transducer housing body 112 and the transducer housing cover 113 in order to keep the transducer housing 111 in a closed configuration, with the transducer housing cover 113 defining a close space with the transducer housing body 112 enclosing the transducer. Other clipping element may be provided between the transducer housing cover 113 and the transmitter 120, again to maintain the transducer housing 111 in a closed configuration.

[0032] Connected to the transducer housing 111 is a transmitter 120. The transmitter 120 is configured to transmit the vibrations produced by the transducer to the outside. The transmitter 120 includes a receiving surface 121 in regard to the transducer housing 111 and an emitting surface 122 opposite to the receiving surface 121, for example on another side of the transmitter 120. In the embodiment of Fig. 1, the transmitter 120 includes a transmitting plate extending in a plane intersecting the axis A, for example with a 90° angle. The receiving surface and the emitting surface are preferably planar and parallel one to the other.

[0033] The peripheral edge of the transmitter 120 according to Fig. 1 includes two superposed ovals, defining a shape of a three-leaf trefoil, or a shape including at least three half-circles. Put differently, the shape of the transmitter of claim 1 is that of an oval with a transversal protrusion, the transversal protrusion having a rounded peripheral edge.

[0034] According to the disclosure, the waveguide 130 is connected to the transducer housing 111 and extends on the receiving surface 121 of the transmitter 120. The waveguide 130 is configured to guide vibrations from the transducer to the receiving surface 121 of the transmitter 120. The waveguide 130 may comprise a rib 131 having an edge aligned on an axis differing from the axis of the vibrator 100 and from the plane of the emitting surface 122.

[0035] The vibrator 100 may comprise a waveguide 130 with two ribs 131 symmetrically disposed with regard to the transducer housing 111. This symmetrical arrange-

ment of the waveguide 130 may provide a balanced distribution of vibrations across the receiving surface 121 of the transmitter 120, enhancing the user's experience of the wellness cushioning element.

[0036] In the embodiment of Fig. 1 the waveguide 130 comprises, on one side of the transducer housing 111, one longitudinal rib 131 with two transversal ribs 132 and on the opposite side of the transducer housing 111, one longitudinal rib 131 with three transversal ribs 132. The transversal ribs 132 may cross the longitudinal rib 131 with a 90° angle. The height of the longitudinal ribs 131 (i.e. the length parallel to the axis A) may decrease from the root portion of the longitudinal rib 131 connected to the longitudinal housing 111, to the extremal portion of the longitudinal rib 131, i.e. the portion the closest from the edge of the transmitter 120.

[0037] Each transversal rib 132 may have a constant height, but the transversal ribs 132 the furthest from the transducer housing 111 may have a smaller height with regard to the transversal ribs the closest from the transducer housing 111. This configuration may allow for more efficient transmission of vibrations from the transducer to the receiving surface 121 of the transmitter 120. Alternatively or in combination, glue and/or ultrasonic welding may be used to secure the transducer housing 111.

[0038] The vibrator 100 also includes a fastener such as at least one and preferably two fastening cuts 140 made in the body of the transmitter 120. These fastening cuts 140 may be located opposite one to the other with regard to the transducer housing 111. For example, these fastening cuts 140 may be located between two transversal ribs 132. Alternatively or in combination, at least one fastener may be provided at a periphery of the transmitter and/or on the transducer housing 111.

[0039] These fastening cuts 140 may serve as attachment points for securing the vibrator 100 within a wellness cushioning element for example by a string or a lace (not shown). The fastening cuts 140 may allow for a secure and stable integration of the vibrator 100 into the wellness cushioning element, ensuring that the vibrations produced by the transducer are effectively transmitted to the wellness cushioning element.

[0040] Referring to Fig. 2, an exploded view of a vibrator 200 for a wellness cushioning element is illustrated. The vibrator 200 differs from the vibrator 100 of Fig. 1 by the transducer housing 211, the waveguide 230 and the fastener including fastening protrusions 240, the other elements being identical.

[0041] The transducer housing 211 is composed of a transducer housing body 212 and a transducer housing cover 213. The transducer housing body 212 has a general shape of a cylinder with an open end and is designed to accommodate a transducer (not shown) that produces vibrations along the axis A of the vibrator 200. The transducer housing cover 213 has also a general shape of a cylinder and is designed to cover the transducer housing body 212 and to close the open end of the transducer housing body 212. In contrast to the embodiment of Fig. 1, the transducer housing cover 213 may not be fixed to the transducer housing body 212 or may be fixed only by a cord, a lace or a flexible leg.

[0042] Similarly to the embodiment of Fig. 1, the transducer housing cover 213, the transducer housing body 212 and/or the transmitter 120 may have clipping elements in order to maintain the fixed to the and the transducer housing 211 in a closed configuration. Alternatively or in combination, glue or ultrasonic welding may be used to lock the closed configuration, or the transducer housing cover 213 may be screwed on the transducer housing body 212.

[0043] A waveguide 230 is connected to the transducer housing 211 and extends on the receiving surface 121 of the transmitter 120. The waveguide 230 includes main ribs 231 and additional ribs 232 protruding from the transducer housing 211 in a circular manner, i.e. around a center formed by the transducer housing 211. These ribs are designed to guide vibrations from the transducer to the receiving surface 121 of the transmitter 120. According to Fig. 2, the main ribs 231 may be disposed opposite one to the other with regard to the transducer housing 211.

[0044] The main ribs 231 may be aligned on an axis differing from the axis of the vibrator 200 and parallel to the plane of the receiving surface and may be close to the longitudinal ribs 131 of Fig. 1 in this regard. The main ribs 231 may be longer and/or thicker with regard to the additional ribs 232. The main ribs 231 may have a constant height (i.e. a length parallel to the axis A) and a rounded extremal portion, as visible in Fig. 2. One of the main ribs 231 may be longer than the other, in order to properly cover the receiving surface 121.

[0045] The additional ribs 232 may be located at a planar angle of 25 to 60° and for example 30" of the main ribs 231, using the transducer housing 211 or axis A as a center. For example, the thickness of the additional ribs 232 may be half the thickness of the main ribs 231, or at least have a thickness of at most 60% and at least 20 % of that of the main ribs 231. For example, grooves in the transducer housing cover 213 may be arranged to accommodate a portion of the waveguide.

[0046] This configuration may allow for more efficient transmission of vibrations from the transducer to the receiving surface 121 of the transmitter 120.

[0047] The vibrator 200 also includes fasteners in the form of fastening protrusions 240, which are positioned on the receiving surface 121. These fastening protrusions 240 may serve to secure the vibrator 200 within a wellness cushioning element for example with a cord or a lace. The fastening protrusions 240 each basically includes a body protruding from the receiving surface 121 parallel to the axis A and including a through hole or a trough groove to accommodate a portion of the cord or the lace.

[0048] Referring to Fig. 3, a perspective view of a vibrator 300 for a wellness cushioning element for according to another embodiment is illustrated in a closed

configuration. The transduce housing body 212 is closed by the transducer housing cover 213 so as to enclose and secure a transducer 250. The vibrator 300 is similar to the vibrator 200 of Fig. 2 with different fasteners. The fasteners are hollow protrusions 340 each adapted to receive a peg (not shown) of a staple 345. The staple 345 is configured to staple the vibrator 300 to a wellness cushioning element and may include two legs each provided with one of the pegs and a central bridge. In an assembled configuration shown in Fig. 3, the legs may extend through the cushioning element foam and the bridge may protrude on a backside of the cushioning element, i.e. on a face opposite to the face intended to receive the user.

[0049] Referring to Fig. 4, a perspective view of a vibrator 400 for a wellness cushioning element for according to another embodiment is illustrated. The vibrator 400 includes a transducer housing 111, which is adapted to receive a transducer (not shown) configured to produce vibrations along the axis A of the vibrator 400. The transducer housing 111 comprises a transducer housing body 112 and a transducer housing cover 113, which together form a protective enclosure for the transducer, similarly to that of Fig. 1.

[0050] Connected to the transducer housing 111 is a transmitter 420. The transmitter 420 is configured to transmit the vibrations produced by the transducer to the outside. In contrast with Figs. 1 and 2, the transducer 420 has an ovoid or oval peripheral edge. The transmitter 420 may include a transmitting plate extending in a plane intersecting the axis A, for example with an angle of 90° similarly to that of Figs. 1 and 2. The transmitter 420 includes a receiving surface 421 and an emitting surface 422 opposite the receiving surface 421.

[0051] The waveguide 130 may be generally similar to that of Fig. 1 and includes longitudinal ribs 131 and transversal ribs 132, for example organized symmetrically with regard to a median axis of the transmitter 420 and/or with regard to the axis A. The longitudinal ribs 131 may contact both the transducer housing 111 and the peripheral edge of the transmitter 420 and/or may have a decreasing height from the root of the longitudinal ribs 131 connected to the transducer housing 111 to the peripheral edge of the transmitter 420, as illustrated in Fig. 4. The height of each of the transversal ribs 132 may be constant and may decrease from the ribs the closest from the transducer housing 111 to the ribs the furthest from the transducer housing 111.

[0052] All the other features of the vibrator 400 may be identical to that of the vibrator 100 of Fig. 1 but may also be identical to that of the vibrator 200 of Fig. 2.

[0053] Referring to Figs. 5a-5b, orthogonal views of a wellness cushioning element 500 adapted to receive vibrators are illustrated. The wellness cushioning element 500 comprises a foam element defining at least one cavity 700 adapted to receive one of the vibrators 100, 200, 300, 400. The wellness cushioning element 500 may be foldable, for example in two or three parts.

[0054] The wellness cushioning element 500 may include multiple cavities 700 positioned at various locations corresponding to different parts of the body. These cavities 700 are represented by dashed peripheral edge, circular shapes with concentric rings representing the vibration emitted by the transducer. The wellness cushioning element 500 may comprise at least two cavities 700 receiving each a vibrator 100, 200, 300 or 400. The at least two cavities 700 may be aligned on a longitudinal or a transversal axis of the wellness cushioning element 500. This alignment may allow for a uniform distribution of vibrations across the wellness cushioning element 500, potentially enhancing the user's experience of the wellness cushioning element.

[0055] The cavities 700 may be of different shapes adapted to house vibration devices such as the vibrators 100, 200, 300 or 400. The cavities 700 may be located near the head, chest, hips, and feet areas, which may allow for targeted vibration transmission to these specific areas of the body. In Fig. 5a, one cavity 700 is arranged to face a neck region, one cavity 700 is arranged to face the middle of a neck region and two cavities 700 are arranged to face each leg.

[0056] The shape of the vibrator and hence the shape of the cavities may be adapted to the body region intended to face the vibrator when inserted in the wellness cushioning element 500. For example, an oval vibrator 400 may be adapted to a neck region while a trefoil vibrator 100, 200, 300 may be adapted to other body regions such as the back region or the leg regions. A trefoil vibrator 100, 100, 300 may be adapted for a region facing both the thighs and the hands. Alternatively, an oval vibrator 400 may also be adapted to the forelegs and/or the arms. Individuals around the world may have different body types and the configuration of the cavities 700 and the choice of the peripheral edge of the vibrators may be adapted to local particularities.

[0057] A power source and control device 600 is depicted in the upper left corner of the. The power source and control device 600 may be configured to power the transducers within the vibrators and control the operation of the vibrator, such as the intensity and frequency of the vibrations. This may allow for a customizable user experience, as the user may adjust the vibrations to their personal preference or relaxation needs.

[0058] The power source and control device 600 may also include an audio system with loudspeakers inserted within the wellness cushioning element 500 or placed outside the well cushion element 500, for example in the form of a headset linked by Bluetooth or cable with the power source and control device 600. Alternatively or in combination, the power source and control device 600 may be connected to a mobile device to control the vibrations. The power source and control device 600 may be adapted to produce vibrations following the audio signal transmitted by the loudspeakers or headset.

[0059] Fig. 5b shows a vibration pattern that may be generated by the wellness cushioning element 500 in-

cluding the vibrators, illustrating a smooth diffusion of vibration throughout the whole surface of the wellness cushioning element 500.

[0060] Fig. 6a and 6b illustrate how the waveguide according to the present disclosure allow a smooth diffusion of vibrations produced by the transducer. In a comparative vibrator 500 without any waveguide (Fig. 6a), the vibrations are linearly transmitted from the transducer housing 511 to the transmitter 520 and then from the transmitter to an outside. However, the vibrations quickly loose energy and are transmitted in a limited volume outside the transmitter 520, i.e. concentrated along the axis A of the vibrator 500.

[0061] In contrast, a vibrator 100, 200, 300, 400 according to the present disclosure and provided with a waveguide 130, 230 limits the energy lost between the transducer housing 11, 211 and the transmitter 120, 420 and allows the vibrations to extend in a larger volume outside the transmitter 120, 420, with a limited concentration on the transducer longitudinal axis.

[0062] More generally, the vibrator, such as vibrator 100, 200, 300 or 400, may be made of a material having a tensile strength of 0.1 to 3.1 N/mm^2, preferably 0.5 to 2.4 N/mm^2. Lower tensile strength materials tend to deform or dampen vibrations while higher tensile strength materials tend to resonate which may change the vibration frequency and/or produce undesired noise. This range of tensile strength may provide the vibrator with the necessary durability and resilience to withstand the mechanical stresses induced by the vibrations and the handling or folding of the wellness cushioning element, while also allowing for an optimal emission of vibrations. The density of the vibrator material may be 0.9 to 1.3 g/cm^3. Higher density tends to slow down wave propagation because denser materials have greater inertia, which resists motion. Lowe density tend to increase vibration damping and thus energy loss.

[0063] The material of the vibrator may be a thermoplastic elastomer. Thermoplastic elastomers are a class of copolymers or a physical mix of polymers which consist of materials with both thermoplastic and elastomeric properties. Examples of thermoplastic elastomers include but are not limited to styrenic block copolymers, polyolefin blends, elastomeric alloys, thermoplastic polyurethanes, thermoplastic copolyesters and thermoplastic polyamides. These materials may offer an optimal emission of vibrations, making them suitable for use in the vibrator.

[0064] The peripheral edge of the vibrator is not limited and may include any circular, half-circular, squared, crossed or rectangular shapes, preferably with rounded edges. The transmitter is preferably a plate element, for example of 1 to 5 mm, globally aligned on a plane intersecting the longitudinal axis A of the transducer housing, for example with an angle of 70 to 110 ° or 80 to 100° with regard to the longitudinal axis A. The waveguide comprises at least one rib and preferably a plurality of ribs extending on at least 50 % of the receiving surface, preferably at least 65 % of the receiving surface and most preferably 80 % of the receiving surface, when connecting all the extremities of the plurality of ribs.

[0065] The waveguide ribs may have a thickness and/or a height decreasing from a center of the transmitter and/or the transducer housing to a peripheral edge of the transmitter. The waveguide ribs may be arranged symmetrically on the receiving surface of the transmitter. In addition, the waveguide of the above disclosed embodiment may be combined. For example, the main ribs 231 and/or the additional ribs 232 of Figs. 2 and 3 may have transversal ribs as disclosed in Fig. 1. Any rib not connected directly or through another rib to the transducer housing may not be part of the waveguide.

[0066] The transducer 250 may have a cylinder external shape and be secured in the transducer housing so as to be at least fixed on a rotation axis. A limited freedom of movement may be allowed transversally, i.e. in the direction of the longitudinal axis A, for example few millimeters. For example, the transducer may have a 5.7 Ω impedance and a 65 Hz resonance frequency. However, any transducer may be accommodated in a vibrator according to the present disclosure. The transducer is preferably configured to emit vibration along the longitudinal axis A.

[0067] The wellness cushioning element, such as wellness cushioning element 500, may be in the form of a mattress, a chair cushion, a pillow or a seat. It may comprise at least one foam layer and preferably two foam layers. For example, the bottom foam layer may be plane and the upper foam layer may include the cavities 700, thus allowing a simple assembly of the vibrators to the wellness cushion element. The bottom layer may be thicker than the top layer.

[0068] The foam layers may have a density ranging from 600 to 1400 g/m^2. This range of density may provide an optimal balance between comfort and support for the user while ensuring an optimal propagation of vibrations. Higher foam density may be uncomfortable for the user while lower density could significantly absorb vibrations, thus decreasing the wellness feeling for the user. The foam may be made of various materials, such as polyurethane, memory foam, latex, or any other suitable material. The foam may also have different levels of firmness, depending on the user's preference or wellness needs. For example, the wellness cushioning element 500 may include one layer or several layers of different foams, i.e. having different materials and/or densities.

[0069] In some cases, the vibrator may be attached to the wellness cushioning element using various methods. For example, the vibrator may be secured within the cavity of the wellness cushioning element using a band, a staple, or an adhesive. The choice of attachment method may depend on the specific design and configuration of the wellness cushioning element and of the vibrator, as well as the desired level of security and stability of the attachment. The band, lace or cord may have an extremity formed, glued ort inserted in the foam and another

extremity arranged to be attached to a fastener, such as the fastening protrusions 340. Different attachment method may be used for different vibrators of a same wellness cushioning element.

[0070] In some aspects, the vibrator may include additional features or improvements to enhance its performance and durability. For example, the vibrator may include a heating system, for example on the transmitter or preferably integrated to the transmitter. The transducer housing may also include a seal and/or a waterproof or water-resistant coating to protect the transducer and other components from moisture. Furthermore, the vibrator may include a noise reduction feature to minimize the noise produced by the vibrations, thereby enhancing the user's comfort and relaxation during use of the wellness cushioning element.

[0071] Improvements and modifications obvious for the skilled person may be brought to the above disclosure without extending outside the scope of the appended claims.

[0072] Here is a list of reference numbers with the corresponding features:

100, 200, 300, 400: Vibrator

111, 211: Transducer housing

112, 212: Transducer housing body

113, 213: Transducer housing cover

A: Transducer Axis

120, 420: Transmitter

121, 421: Receiving Surface

122, 422: Emitting surface

130, 230: Waveguide

131, 231: Longitudinal Ribs

132, 232: Transversal Ribs

140, 240, 340: Fastener

250: Transducer

500: Wellness cushioning element

600: Power source and control device

700: Cavity in wellness cushioning element

Claims

1. A vibrator (100, 200, 300, 400) for a wellness cushioning element, comprising:

   - a transducer housing (111, 211) adapted to receive a transducer configured to produce vibrations along an axis (A) of the vibrator (100, 200, 300, 400),
   - a transmitter (120, 420) configured to transmit the vibrations of the vibrator (100, 200, 300, 400) to an outside, and fixed to the transducer housing (111, 211), the transmitter (120, 420) comprising a receiving surface (121, 421) in regard to the transducer housing (111, 211),
   - a waveguide (130, 230) fixed to the transducer housing (111, 211) and extending on the receiving surface (121, 421) of the transmitter (120, 420) and configured to guide vibrations from the transducer to the receiving surface (121, 421) of the transmitter (100, 200, 400).

2. The vibrator (100, 200, 300, 400) of claim 1, wherein the transmitter (120, 420) is integral with the transducer housing (111, 211) and the waveguide (130, 230).

3. The vibrator (100, 200, 300, 400) of claim 1 or 2, wherein the vibrator (100, 200, 400) includes the transducer in the transducer housing (111, 211).

4. The vibrator (100, 200, 300, 400) of any one of claims 1 to 3, wherein the transmitter (120, 420) includes a transmitting plate extending in a plane intersecting the axis (A) of the vibrator and including the receiving surface (121, 421) and an emitting surface (122, 422) opposite the receiving surface (121, 421), an angle between the plane and the axis being preferably 70° to 110°.

5. The vibrator (100, 200, 300, 400) of claim 4, wherein the shape of a peripheral edge of the transmitter (120, 420) is at least partially rounded.

6. The vibrator (100, 200, 300, 400) of claim 4 or claim 5, wherein the waveguide (130, 230) comprises at least one rib (131, 231) having an edge aligned on an axis differing from the axis (A) of the vibrator (100, 200, 400) and from the plane of the transmitting plate.

7. The vibrator (100, 200, 300, 400) according to claim 6, wherein the waveguide (130, 230) comprises at least two ribs (131, 231) symmetrically disposed with regard to the transducer housing (111, 211).

8. The vibrator (100, 200, 300, 400) according to claim 6 or claim 7, the waveguide comprising a plurality of

ribs having a thickness and/or a height decreasing from the transducer housing (111, 211) to a peripheral edge of the transmitter (120, 420).

9. The vibrator (100, 200, 300, 400) according to any of claims 1 to 8, wherein the vibrator (100, 200, 400) is made of a material having a tensile strength of 0.1 to 3.1 N/mm^2, the material being preferably thermoplastic elastomer.

10. A vibrator system for a wellness cushioning element, comprising:

at least one vibrator (100, 200, 300, 400) according to any of claims 1 to 9;
a power source adapted to power the transducer; and
a controller adapted to control the transducer and/or the power source.

11. A wellness cushioning element (500) comprising at least one cavity (700) and the vibrator system of claim 10, wherein the at least one vibrator (100, 200, 300, 400) is inserted in the at least one cavity (700).

12. The wellness cushioning element (500) of claim 11, comprising a foam element defining the at least one cavity (700), the foam element having a density of 600 to 1400 g/m^2.

13. The wellness cushioning element (500) of claim 11 or 12, comprising at least two cavities (700) receiving each a vibrator (100, 200, 300, 400), the cavities (700) being aligned on a longitudinal or a transversal axis of the wellness cushioning element (500).

14. The wellness cushioning element (500) of any of claims 11 to 13, wherein the at least one cavity (700) is shaped to closely conform to the vibrator (100, 200, 300, 400) inserted therein.

15. A method to enhance wellness of a user, comprising subjecting to vibrations a user sitting or lying on the wellness cushioning element (500) of any of claims 11 to 14.

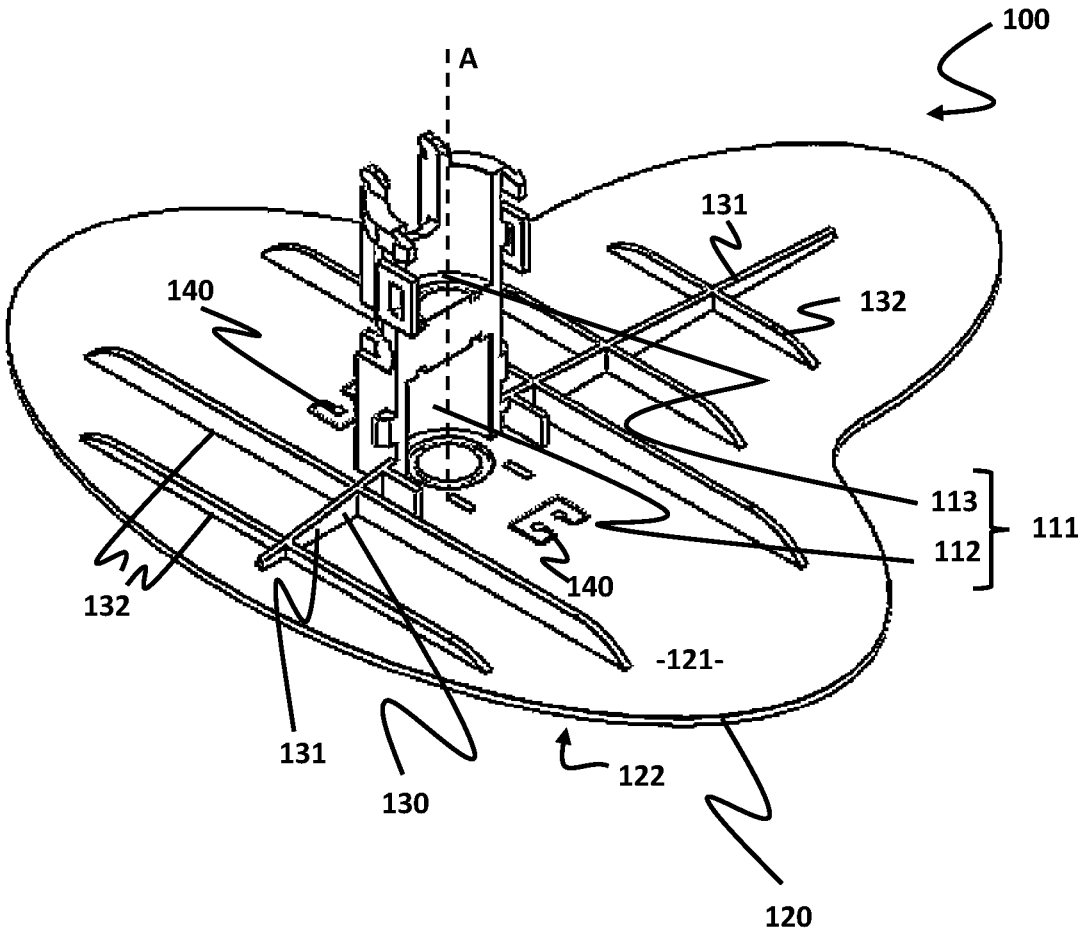

Fig. 1

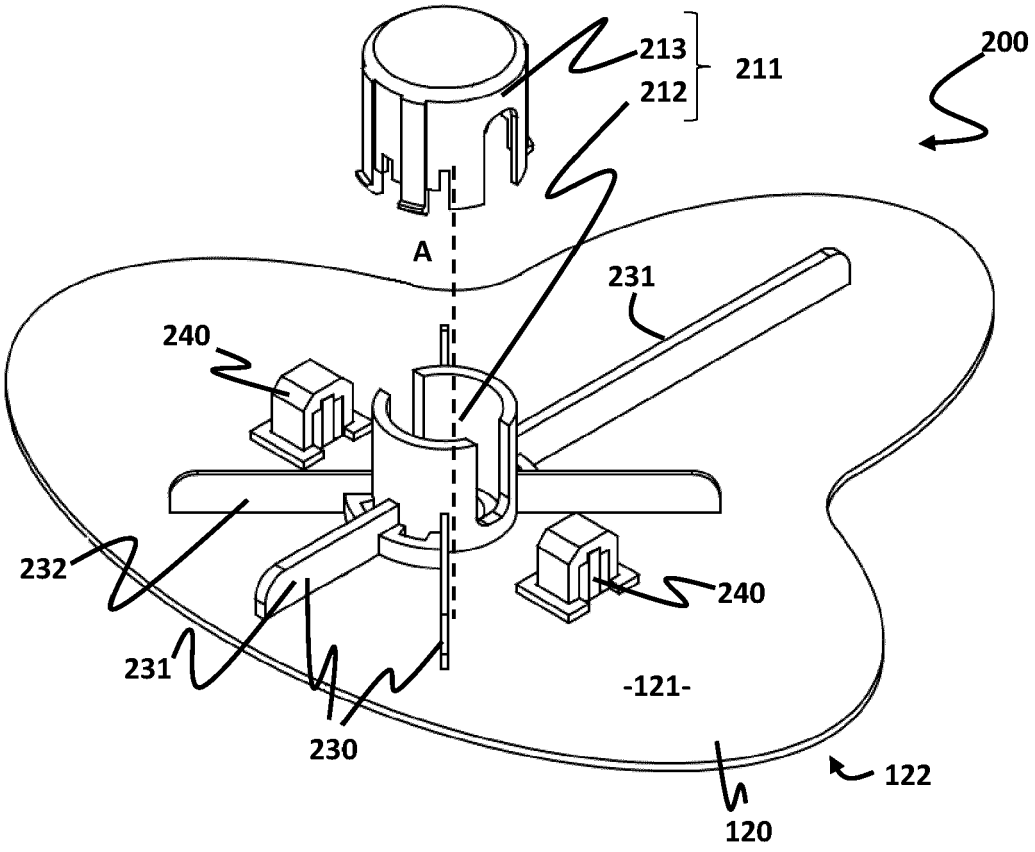

Fig. 2

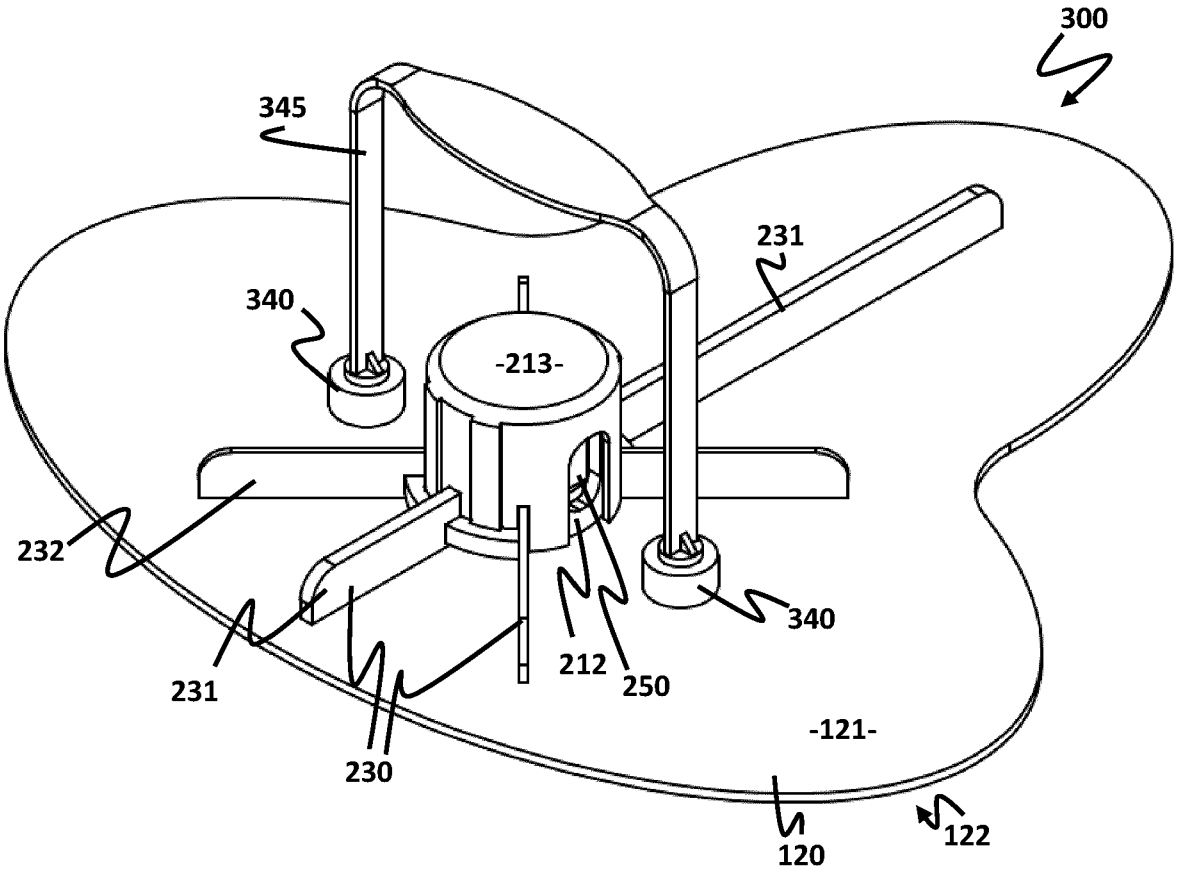

Fig. 3

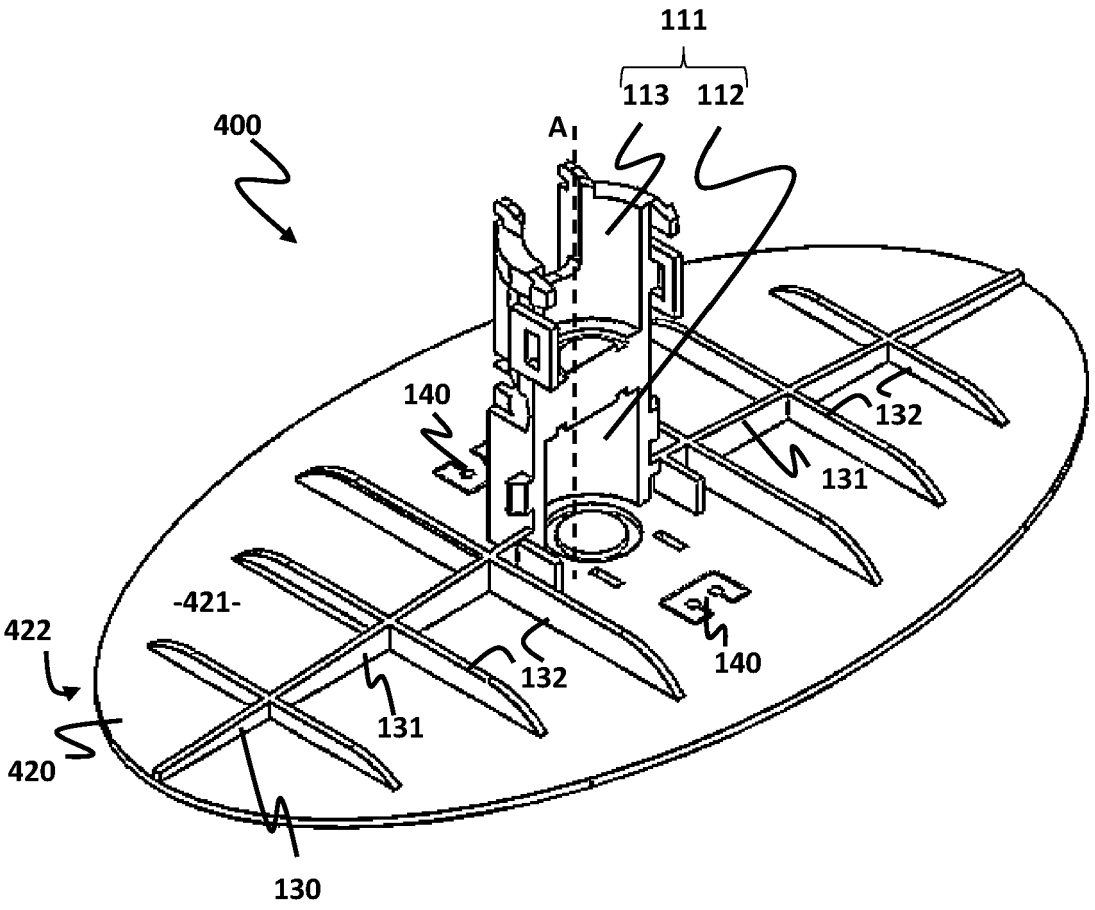

Fig. 4

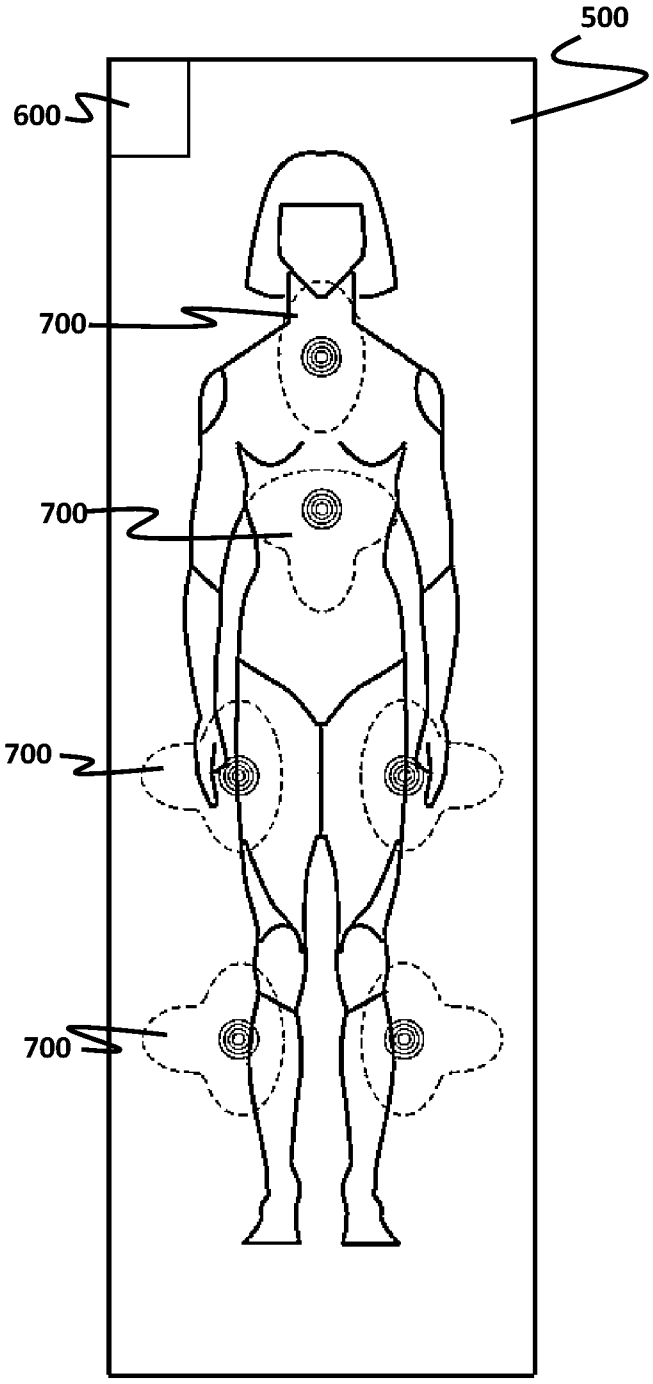

Fig. 5a

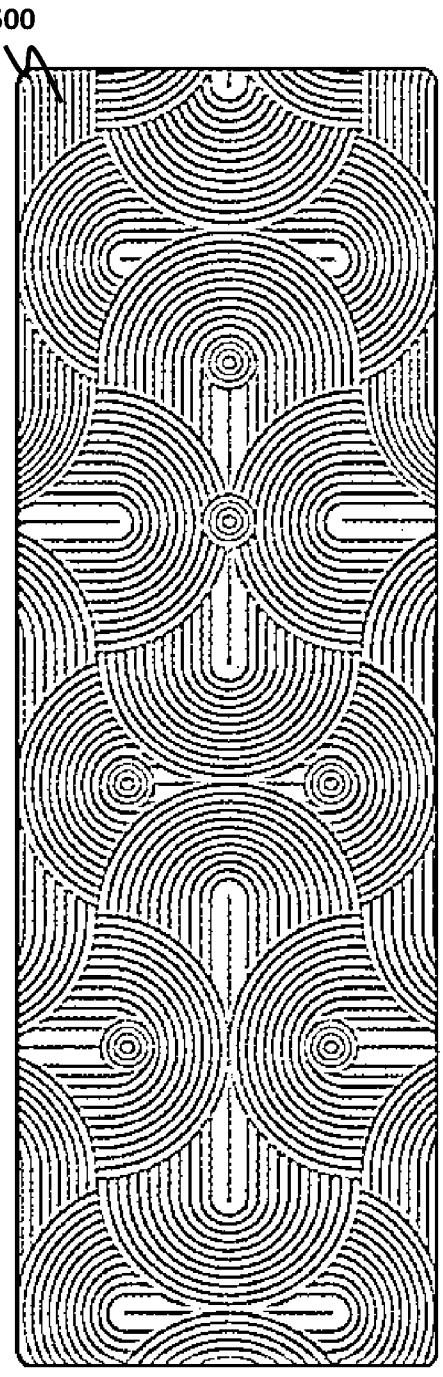

Fig. 5b

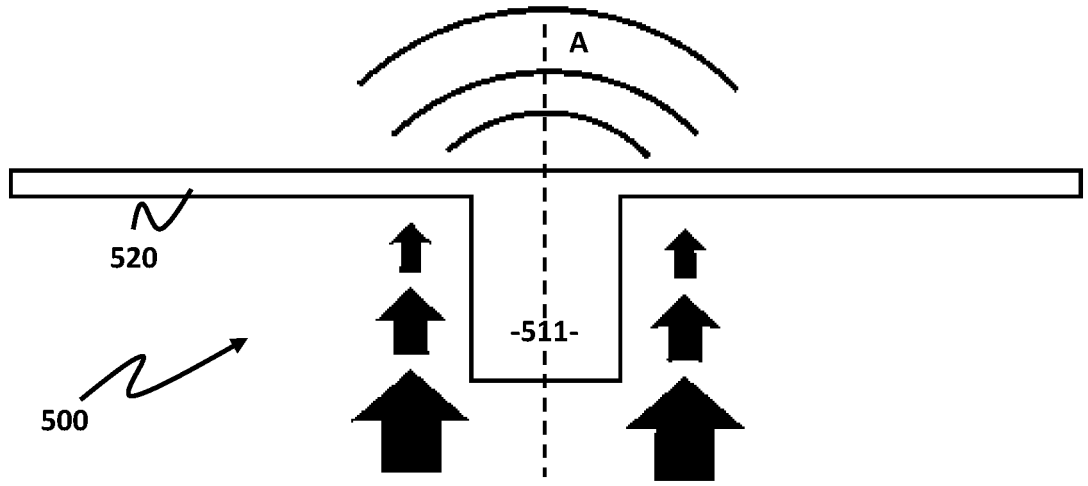

Fig. 6a

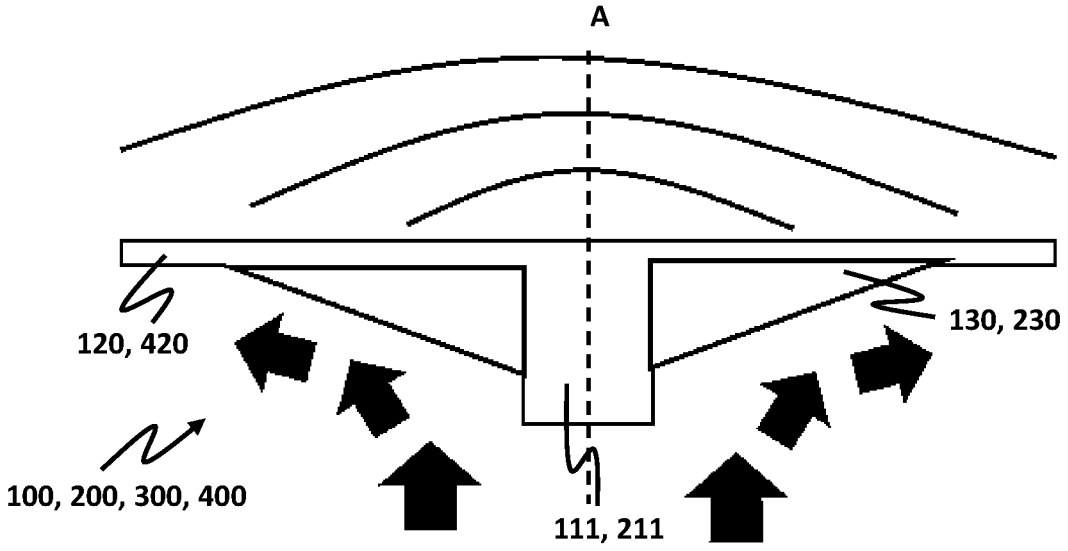

Fig. 6b

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EUROPEAN SEARCH REPORT

Application Number
EP 25 15 0146

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 June 2025	Brumme, Ion

CATEGORY OF CITED DOCUMENTS

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